

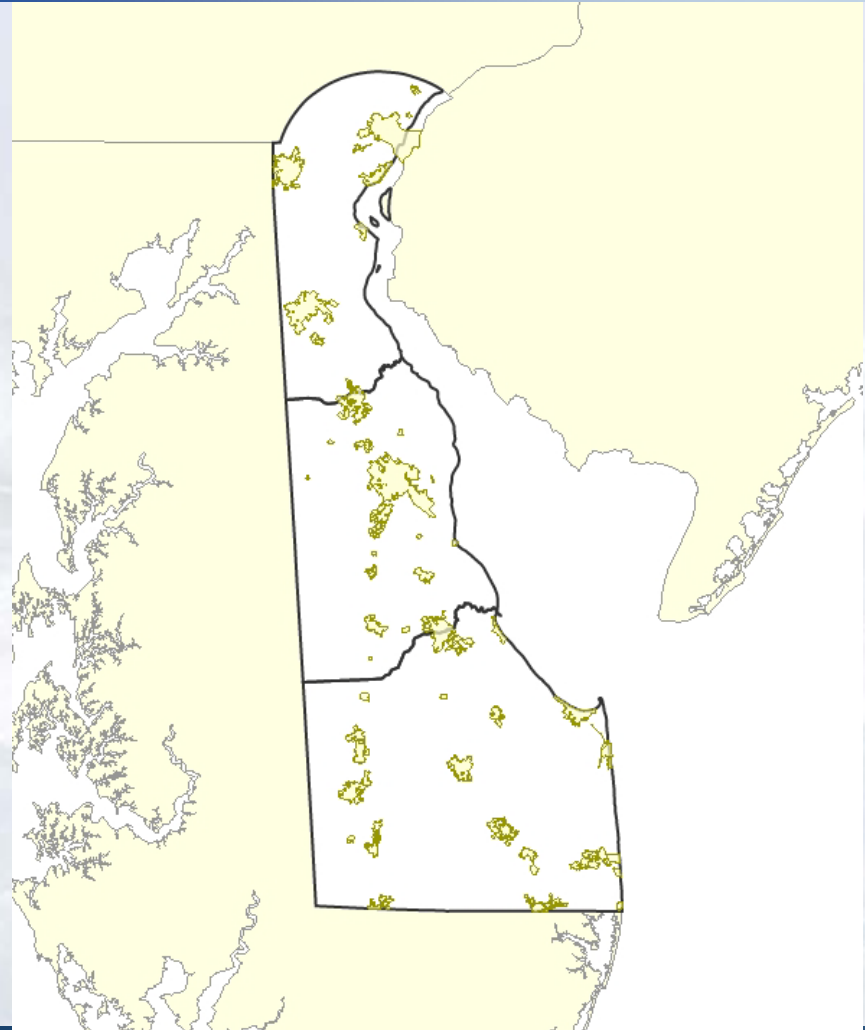
# ***Files from the First State:*** **Four Decades of Preparing for** **Superstorm Sandy**

**Susan Love, Planner IV**  
**DNREC Delaware Coastal Programs**  
**[Susan.Love@state.de.us](mailto:Susan.Love@state.de.us)**



# Dela-where?

- 2000 square miles
- 989,000 residents
- 3 counties
- 459 persons per square mile
- 15% pop increase 2000-2010
- 396,000 households



# A History of Holiday Flooding

- Ash Wednesday '62
  - ✓ Lewes, 4.6ft over MHHW
- Mothers Day '08
  - ✓ Lewes, 3.24ft over MHHW
- Veterans Day '09
  - ✓ Lewes 3.23ft over MHHW
- Sandy, 2012
  - ✓ Reedy Point—3.26ft over MHHW
  - ✓ Lewes—4.2 ft over MHHW
- Dec 21, 2012
  - ✓ Reedy Point—3.36ft over MHHW



Bradford Street, Wilmington—Dec 21, 2012

# 40 years of SLR & Storm Preparedness

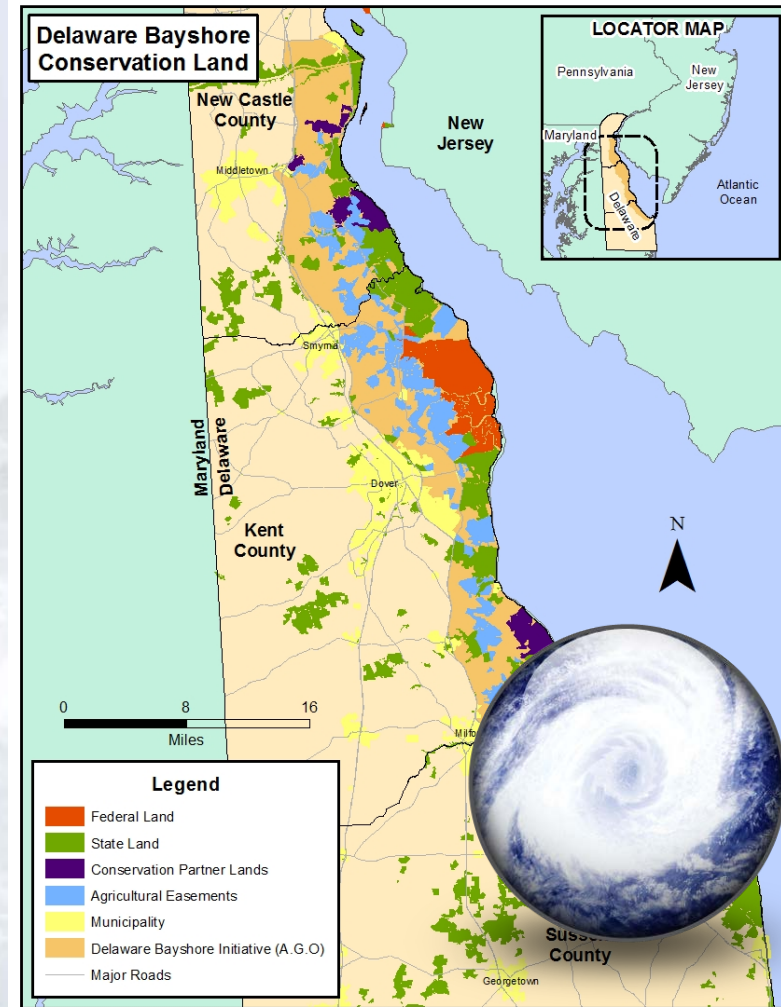
- State Coastal Zone Act
- Dedicated land preservation funding
- Beach Preservation Act
- Federal Coastal Zone Management Act
- Floodplain Mitigation Program





# CZA and Aggressive Coastal Land Protection Strategy = Storm Resiliency

- No industrial development permitted after 1972
- Significant Percentage of DE Coastal Area in conservation
- 276 ppl/sq. mile
  - ✓ Kent County Total
- Limited infrastructure



# Big Beach: Big Sigh of Relief (for some)

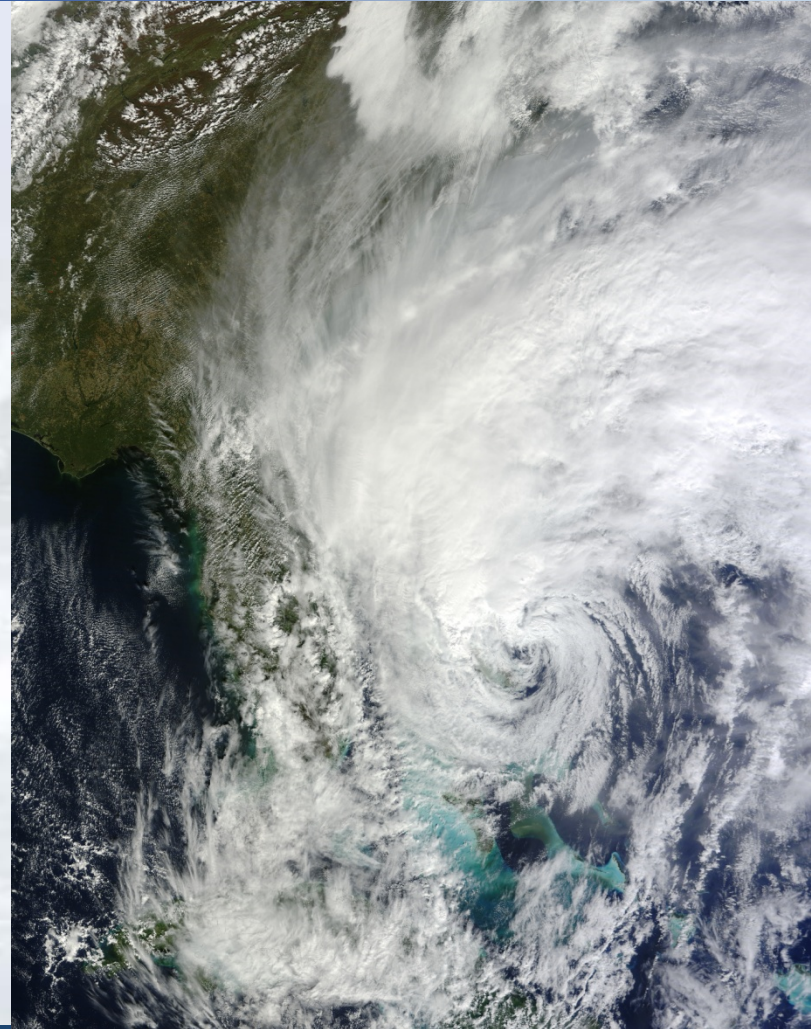
- 18.2 M c.y. sand on ocean beaches
  - ✓ 1960-2012
- State funded projects on Bay beaches
  - ✓ Does not include all
  - ✓ Must provide public access



DE Bay Beach  
Replenishment Project, 2012

# Before the Storm

- Statewide Inundation Maps
- Sea Level Rise Adaptation Planning
- Coastal Flood Early Warning System
- Community Resiliency Planning

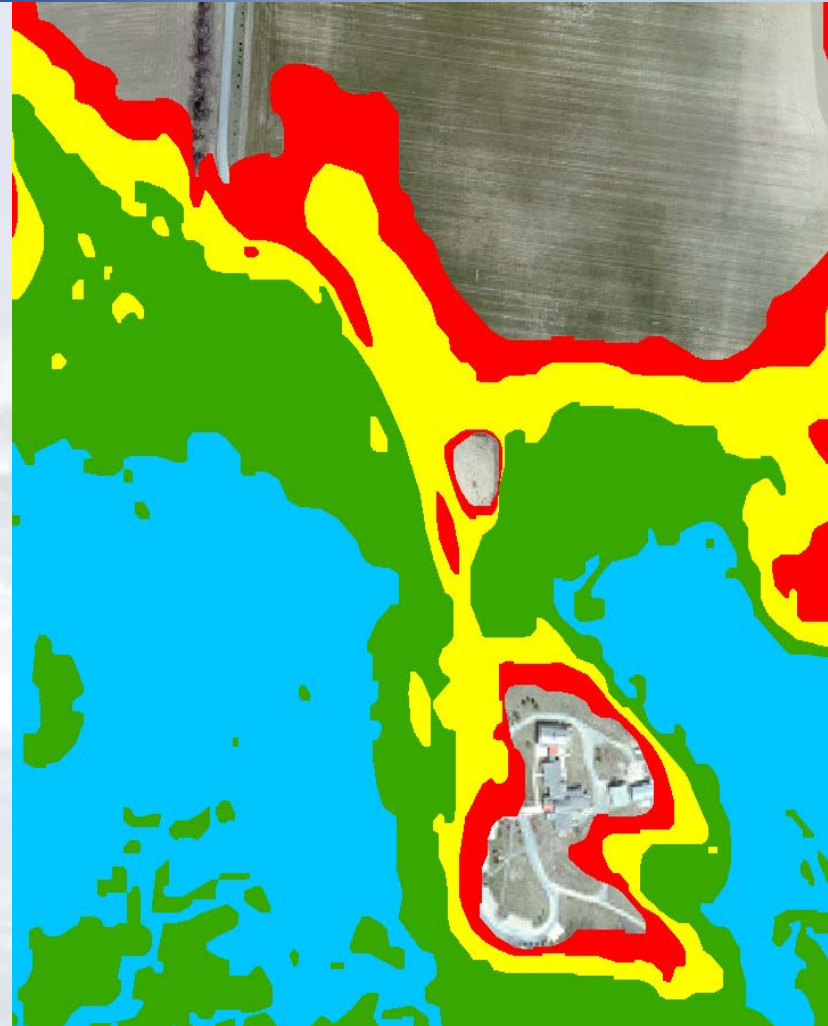




# Sea Level Rise Scenario Maps

## DNREC Planning Scenario Maps

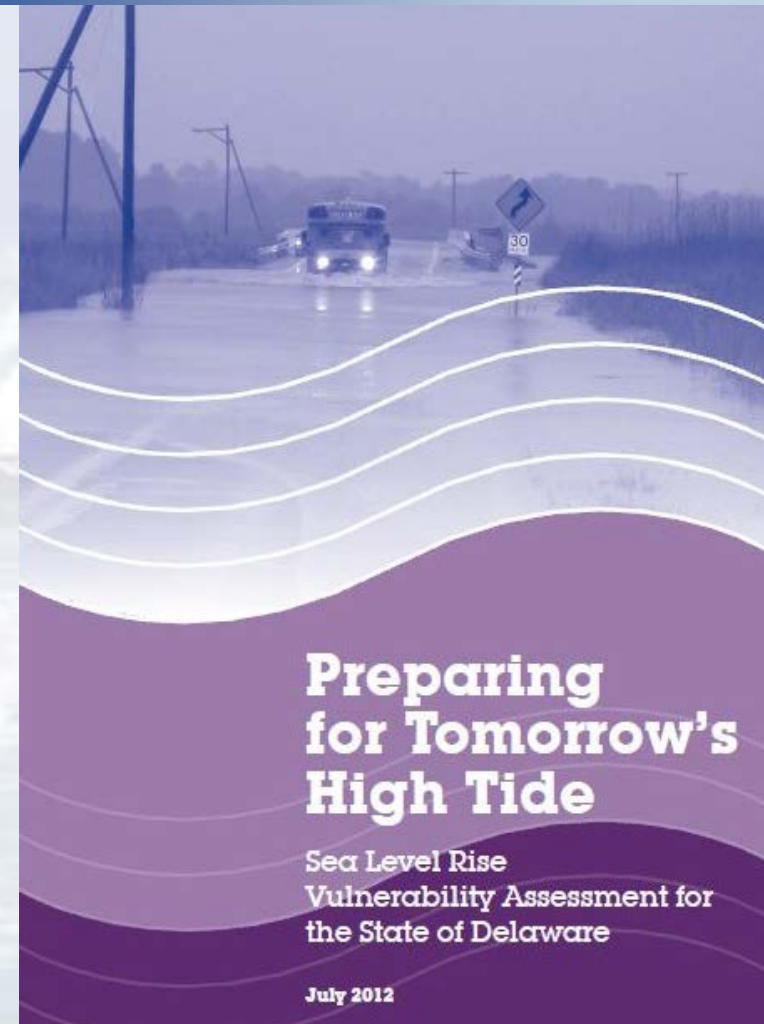
- ✓ Bath-tub Model – does not account for future changes in shoreline or elevation
- ✓ High resolution aerial photography (LiDAR)
- ✓ For planning purposes only



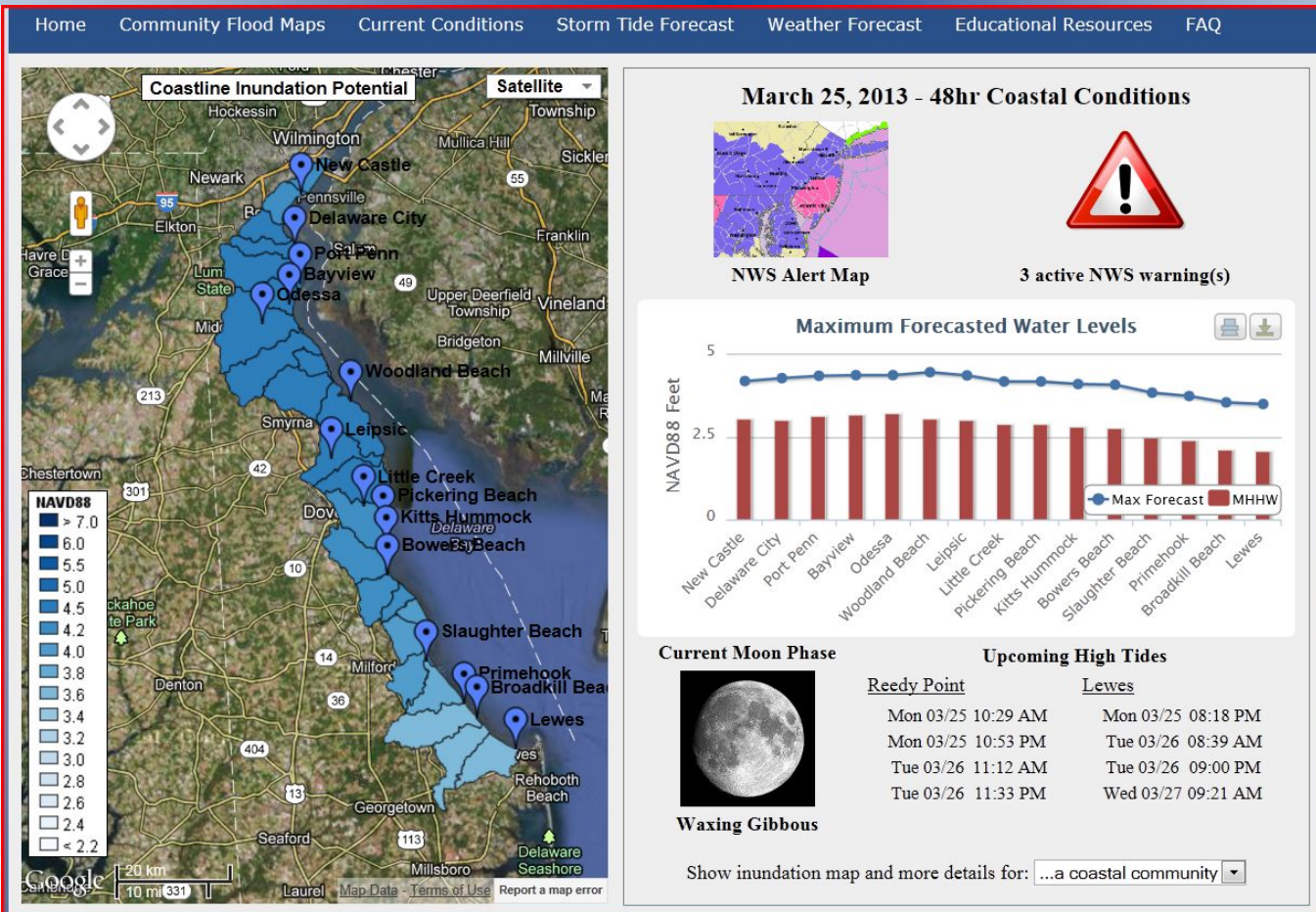


# Vulnerability Assessment

- Potentially Inundated
  - ✓ 8-11% Total Land Area
    - ***Tax assessed value \$1.5 B***
  - ✓ Direct effects in all counties and 31 towns
- Forms the baseline for Adaptation Planning
- Released Sept, 2012
  - ✓ Significant Press Coverage
  - ✓ Significant public involvement



# Coastal Storm Warning System



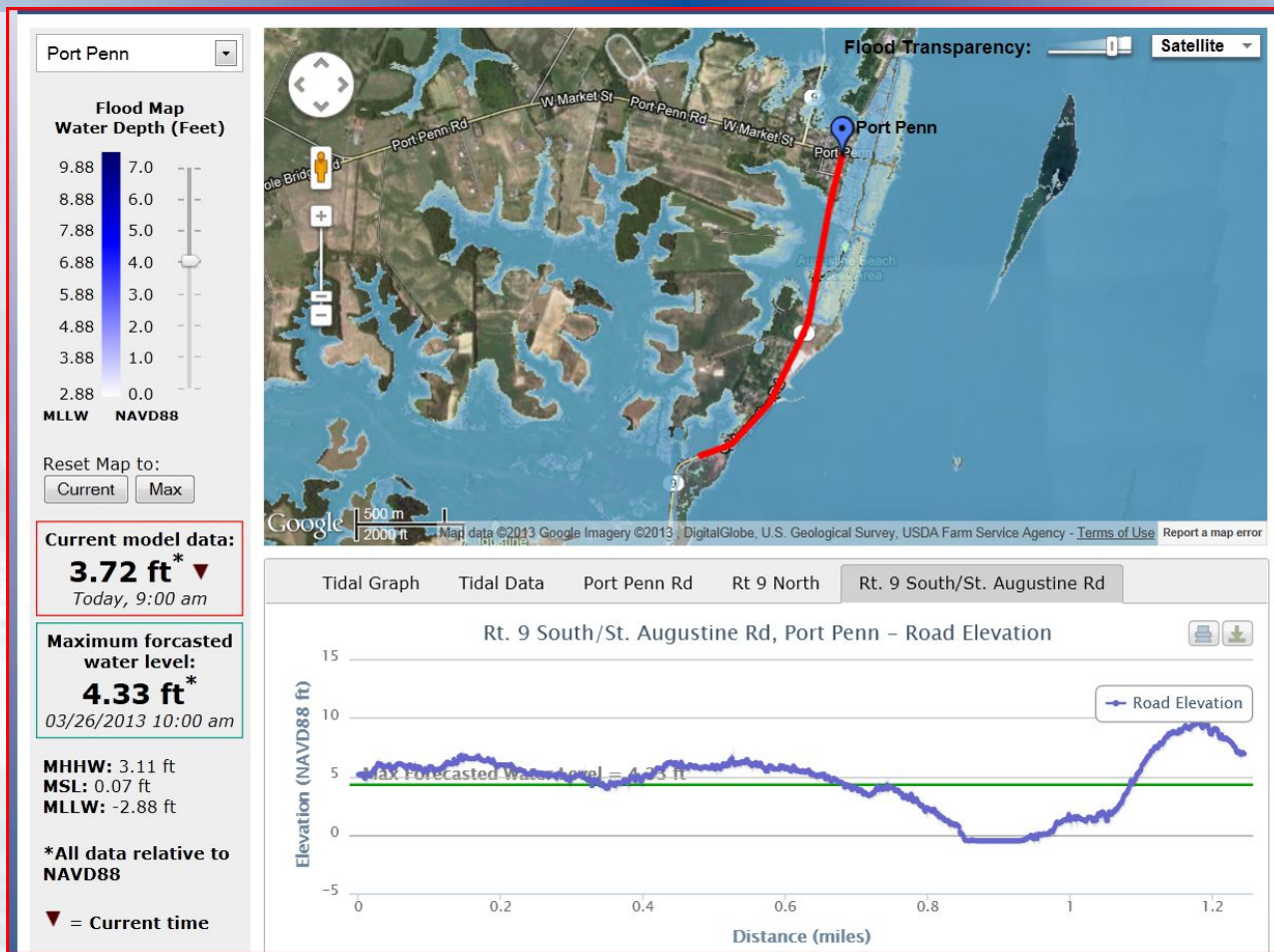
[www.coastal-flood.udel.edu](http://www.coastal-flood.udel.edu)



Delaware's Sea Level Rise Initiative



# Coastal Storm Warning System



[www.coastal-flood.udel.edu](http://www.coastal-flood.udel.edu)



# Community Resiliency Planning and Drainage Assistance

- 12 Incorporated Bay/Ocean Towns
  - ✓ 11 are engaged in slr/resiliency planning activities
- 4 with Sea Grant & Coastal Program on planning
- 5 more with grants and training



Mother's Day Storm, 2008

# Sandy Impacts in Delaware

- Record tides at 9 of 17 gauges
  - ✓ 2 failed gauges
- Back-Bay Flooding
- Roadway Closures
- Minor electrical outages

	Hurricane Sandy			Prior Record High				
Station	Gage Height (ft)	Date	Time <sup>2</sup>	Gage Height (ft)	Date	Event	Tidal Datum	Data Source
Delaware River at Marcus Hook	9.94	10/30/12	3:30	9.76	4/17/11	low pressure system	MLLW	NOAA
Christina River at Newport	***8.06	10/30/12	2:18	8.07	9/17/99	Floyd	NGVD 1929	USGS
Christina River at Wilmington	8.26	10/30/12	2:36	7.71	4/16/11	low pressure system	NGVD 1929	USGS
Delaware River at New Castle	failed during storm			*7.68	5/12/08	Mothers Day Storm	NAVD 1988	USGS
Delaware River-Delaware City	9.74	10/30/12	1:54	9.38	4/16/11	low pressure system	MLLW	NOAA
Reedy Pt.- Mouth of C&D Canal	9.10	10/30/12	1:42	9.23	4/16/11	low pressure system	MLLW	NOAA
Murderkill River at Frederica	4.84	10/29/12	13:18	5.15	5/12/08	Mothers Day Storm	NGVD 1929	USGS
Murderkill River at Bowers	4.79	10/29/12	10:36	8.23 <sup>y</sup>	3/3/94	Northeaster	NAVD 1988	USGS
Ship John Shoal	9.42	10/30/12	0:12	9.29	4/16/11	low pressure system	MLLW	NOAA
Brandywine Shoal Light	failed during storm			8.66	8/27/11	Irene	MLLW	NOAA
Breakwater Harbor at Lewes	8.70	10/29/12	9:36	9.22	3/6/62	March '62 Storm	MLLW	NOAA
Indian River Inlet	**6.51	10/29/12	9:54	**5.86	2/5/98	Northeaster	NGVD 1929	USGS
Indian River at Rosedale	6.23	10/29/12	10:48	6.99	2/5/98	Northeaster	NGVD 1929	USGS
Rehoboth Bay at Dewey Beach	5.34	10/29/12	22:30	4.45	10/31/99	Halloween Northeaster	NGVD 1929	USGS
Jefferson Creek at South Bethany	5.44	10/30/12	0:42	3.52	9/19/03	Isabel	NGVD 1929	USGS
Little Assawoman Bay	4.82	10/30/12	0:00	3.13	10/25/05	Wilma	NGVD 1929	USGS
Nanticoke River at Sharptown	5.59	10/30/12	4:36	4.11	3/3/94	Northeaster	NGVD 1929	USGS



# Back Bay Flooding Takes many by surprise





# The New Indian River Inlet Bridge



# Next Steps

- Increased Participation in CRS
  - ✓ Only 9 of 60 now
- Finalize SLR Adaptation Plan
- Continue adaptation work with locals, agencies



# Thank you!

For more information:

Online SLR Map Viewer: <http://de.gov/slrmap>

Vulnerability Assessment: <http://de.gov/slrva>

Flood Viewer: [www.coastal-flood.udel.edu](http://www.coastal-flood.udel.edu)

Adaptation Options:

<http://de.gov/adaptationengagement>

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